



International Committee on  
Global Navigation Satellite Systems

# Possible Emissions in GNSS Frequency Bands other than GNSS Signals

## Interference Estimation

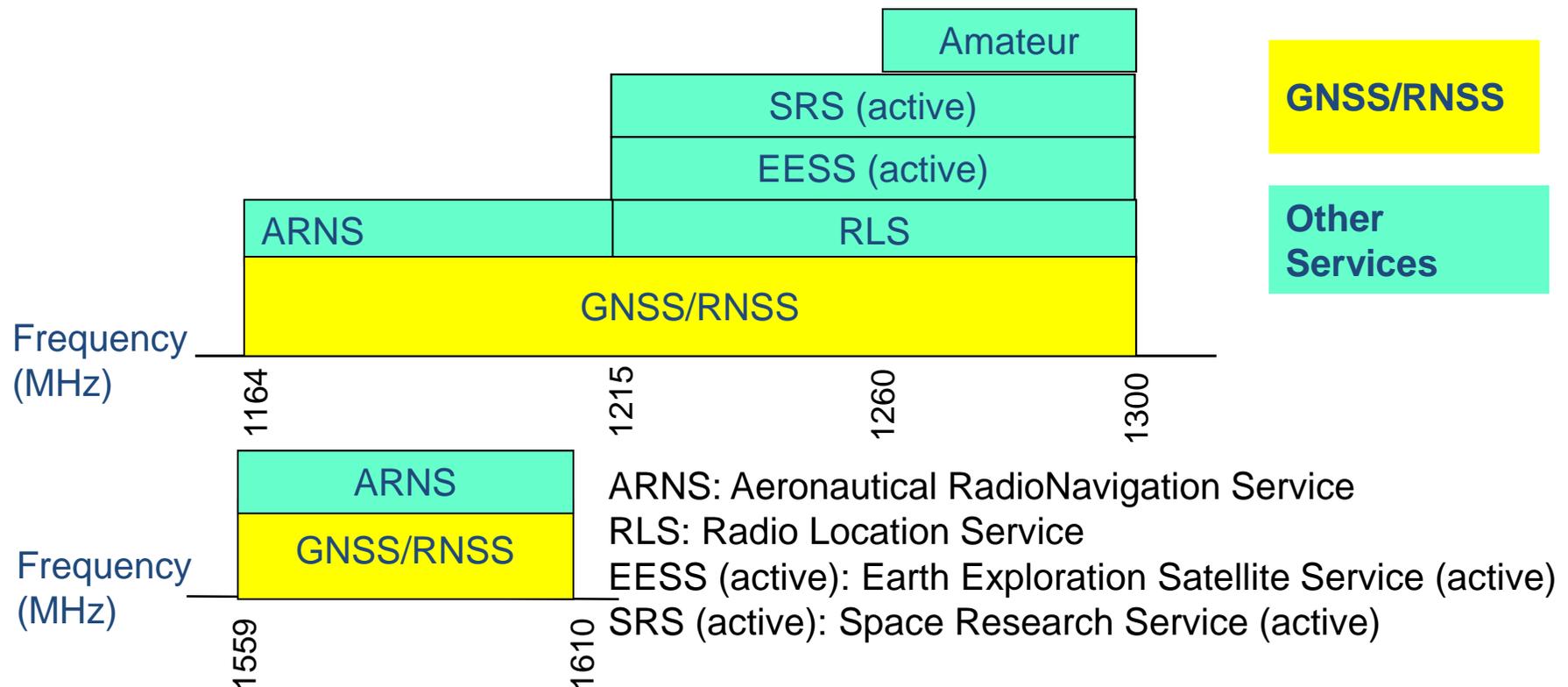
- When you use or design GNSS receivers, it is important to estimate external interference levels, in order to examine such GNSS receiver performance.
- For this purpose, what kind of emissions can exist in GNSS frequency bands should be recognized from legal viewpoint.
- If you suspect that your GNSS receiver is interfered, the first thing you should do is to check whether such interference emissions are illegal or not.

## Types of Emissions

- The following three (3) types of emissions are considered to be legal;
  - Radio Service Emissions:
  - ISM Electromagnetic Emissions:
  - Short Range Radio Device Emissions:

## Radio Service Emissions (1 of 2)

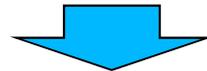
- Since GNSS/RNSS frequency bands are shared with other radio services, GNSS receivers may encounter emissions from such radio services.



**Check national frequency allocations in your country!**

## Radio Service Emissions (2 of 2)

- As far as GNSS/RNSS is allocated in domestic allocation, such GNSS/RNSS allocations are expected to be protected by national regulations/guidelines. However, the details of protection may vary among national agencies.
- In case that GNSS/RNSS domestic allocations do not exist, no protection of GNSS/RNSS can be expected.



- Any information is welcomed about details of GNSS/RNSS domestic allocations status, in order to improve interference environment of GNSS receivers.

## ISM\* Electromagnetic Emissions (1 of 2)

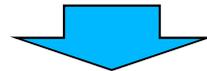
- Certain levels of electromagnetic emissions from industrial machinery and home appliances should also be recognized.
- International limits for this type of emissions are regulated in IEC CISPR Publication 11.
- Domestic limits for this type of emissions may vary.

**Check national regulations/guidelines in your country!**

\*: *industrial, scientific and medical (ISM) applications* (of radio frequency energy):  
Operation of equipment or appliances designed to generate and use locally radiofrequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of *telecommunications*.

## ISM Electromagnetic Emissions (2 of 2)

- Though ISM electromagnetic emissions are regulated in IEC, no detailed compatibility between CISPR limits and GNSS receivers protection criteria has been studied yet.
- Thus, there is still uncertainty that interference into GNSS receivers may occur even with the emissions from ISM equipment in accordance with CISPR publication 11.



- Any information is welcomed about possible interference incidents from ISM electromagnetic emissions, in order to improve interference environment of GNSS receivers.

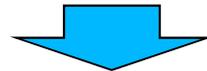
## Short Range Radio Emissions (1 of 2)

- Most of national agencies prohibit non-licensed emissions except ISM frequency bands. However, some national agencies apply unique regulations to allow extremely low power radio stations to be operated in entire radio frequency bands. Such unique regulations can be significantly different.
  - US: Federal Regulations Title 47, Part 15  
(e.g, e.i.r.p. density limit of -71.3 dBW/MHz in L-band)  
[http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title47/47cfrv1\\_02.tpl](http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title47/47cfrv1_02.tpl)
  - Japan: Extremely low power radio station  
(e.g., e.i.r.p. density limit of -94.3 dBW/MHz in L-band)  
<http://www.tele.soumu.go.jp/e/ref/material/rule/index.htm>

**Check national regulations/guidelines in your country!**

## Short Range Radio Emissions (2 of 2)

- Though extremely low power radio emissions for short range communication is allowed in some countries, compatibility between CISPR limits and GNSS receivers protection criteria may not be sufficient.
- Thus, there is still uncertainty that interference into GNSS receivers may occur even with such extremely low power radio emissions.



- Any information is welcomed about possible interference incidents from extremely low power radio emissions, in order to improve interference environment of GNSS receivers.

# Remark

- Emissions not categorized in these three (3) ones are illegal. In case you encountered such emissions, you have rights to request such emission to be eliminated.
- GNSS jammers is one example of such illegal emissions. How strictly such prohibition is enforced depends on each national agencies.

## Summary

- It is important to have proper knowledge of regulations/guidelines of radio emissions, in order to protect your GNSS use.
- Protection of GNSS use must be implemented by national regulations/guidelines. But levels of protection vary among different national agencies.
- In case of interference incidents on GNSS use, it is encouraged to report such details to GNSS community as well as national agencies, in order to improve the interference environment in GNSS frequency bands.